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## METHODOLOGICAL PLURALISM IN ECONOMICS: THE ‘WHY’ AND ‘HOW’ OF CAUSAL INFERENCES\*\*

### Abstract

Recently, two distinct notions of pluralism have been put forward in regard to research methods in economics: (1) model pluralism, stating that economists construct many theoretical models offering descriptions of actual or possible mechanisms and use different models for different purposes, and (2) evidential pluralism, according to which causal claims are established on the basis of theoretical conjecture and by observing the operation of a difference-making factor. In this paper, I make a case for *methodological* pluralism. I argue that economists not only use different research methods but also interpret their role in causal inference differently — depending on which (big-M) Methodological school they subscribe to. The argument proceeds by analyzing examples of recent economic research appealing to different Methodological commitments.

*Keywords:* causal inference, philosophy of economics, methodological pluralism, evidential pluralism

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Dani Rodrik (2015: 8) compares economics to a library of models. On his view, which can be referred to as model pluralism,<sup>1</sup> “the dismal science” pro-

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<sup>1</sup> The focus of Rodrik’s (2015) work is on the mainstream deductive (theoretical) models. While the material he analyzes is methodologically unified, these models (i.e., axiomatic and mathematically tractable models usually assuming a version of rationality and market equilibrium) target different phenomena or different aspects of the same phenomena and suggest inconsistent policy conclusions (Rodrik 2015: 200).

ceeds by delivering new models rather than rejecting and revising models and theories as the traditional view of scientific practice would have it (e.g., Blaug 1992). According to model pluralism, the presence of different models of the same phenomena in scientific discourse is acceptable as long as each model serves some specific purposes better than its competition. Rodrik's view on the modeling practices of economists has raised considerable interest among philosophers of economics, who focused on refining his views (Mäki 2018), analyzing how models are selected (Grüne-Yanoff, Marchionni 2018), and how economists explain with pluralistic models (Aydinonat 2018). However, the "models" analyzed by the philosophers supporting this view are defined relatively strictly considering the actual research practices of economics and focus on axiomatic and mathematically tractable models that share common presuppositions about rationality and market efficiency. Similarly, Rodrik (2015), in line with mainstream philosophy of economics, focuses on theoretical models and stresses the role of deductive models in economics. The debate over the pluralism of economic models focuses on theoretical, axiomatic models of phenomena that constitute only a fraction of contemporary research (cf. Hamermesh 2013 for a review).

François Claveau (2012) and Alessio Moneta and Frederica Russo (2014) argue for a pluralism of evidence in causal inference in economics. However, they support pluralism that defines causal claims as such correlations that can be mechanistically explained and therefore require both a theoretical and an econometric model. While Claveau (2012) discusses case studies from an OECD (1994) unemployment report to argue that various sources of evidence (such as theoretical modeling and empirical evidence for difference-making factors) support different causal conclusions (i.e., not all types of evidence are necessary for each causal conclusion), Moneta and Russo (2014) claim that both mechanistic and difference-making evidence is necessary to justify a causal claim in economics, just as in health sciences (Russo, Williamson 2007). In this article, I argue that economists use different research methods (a claim that is labeled "evidential pluralism") and construct different models of the same phenomena (model pluralism) because they are committed to different Methodological (epistemological) views<sup>2</sup> (the claim I label "Methodological pluralism"). In other words, I contend that mainstream economics is a Methodologically pluralist discipline in the sense that economists are not only pluralist in regard to using different types of evidence and research methods but

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<sup>2</sup> Given the distinction between small-m methodology and big-M methodology (McCloskey 1998, Boland 2014), I maintain that economists as a group are committed to (big-M) Methodological pluralism while evidential pluralism could be understood as (small-m) methodological pluralism.

also interpret their results and connect different types of evidence in a way presupposing the views on science accepted by different Methodological schools in the philosophy of economics (Maziarz 2018b). The article proceeds by discussing case studies of recent causal economic research published in the three top economic journals in the 2005-2015 period (Maziarz 2018a) with a view to reconstructing Methodological commitments and relating them to debates in the philosophy of economics and the philosophy of science.

In section 1, I introduce and define three types of research methods (theoretical modeling, econometric modeling, and laboratory experiment) used by economists in their case studies. In section 2, I analyze Jidong Zhou's (2014) study, which uses an axiomatic model as exclusive evidence for a causal claim, and interpret it as a theoretical conjecture about a possible mechanism. In section 3, I discuss Björn Bartling's, Ernst Fehr's, and Klaus M. Schmidt's (2012) research combining a laboratory experiment with theoretical models as an attempt at providing evidence for the reality of a mechanism fulfilling the requirement of experimental closure. In section 4, I show that Boyan Jovanovic and Balázs Szentes (2013) use a theoretical model with a view to describing a dataset in a way inspired by Milton Friedman's (2008 [1953]) instrumentalist methodology. In section 5, I analyze a study by Paul Beaudry, Mark Doms, and Ethan Lewis (2010), who also use a theoretical and an econometric model in tandem but interpret it as an example of the confirmationist approach. In section 6, I elaborate on the view that mainstream economics is a Methodologically pluralist science. Finally, I summarize the argument and indicate areas of further research.

# 1. THE PLURALITY OF RESEARCH METHODS USED FOR CAUSAL INFERENCE

The research methods used in contemporary economics to provide evidence for causal claims cover theoretical (axiomatic) models, econometric models estimated on observational data, experimental and quasi-experimental research designs (such as randomized field trials, natural experiments, and simulations), and case studies. Considering the purpose of the article, which is to argue for Methodological pluralism, I am going to analyze (a) the way in which economists use theoretical models, econometric models, and randomized laboratory experiments to justify causal claims and (b) the evidential role played by these research methods. In this section, I develop definitions of these research methods that are abstractions based on a systematic literature review (Maziarz 2018a).

Although some authors (e.g., Guala 2005, Moneta, Russo 2014, Hoover 2001, Reiss 2013) discuss other research methods, the most hotly debated research method in mainstream economics is theoretical (axiomatic) modeling. Theoretical models specify assumptions describing the constraints and preferences of economic agents. These agents are usually faced with a maximization problem requiring a choice. Contrary to econometric models estimated on data (considered below) and axiomatic (deductive) calibrated models, such models are non-empirical in the sense that there is no empirical input other than the axioms provided by the modeler. Roger Backhouse (2002: 202) depicts this modeling practice as follows: “[c]reating a theoretical model involves finding a set of simplifying assumptions such that it is possible to demonstrate, to generally accepted standards of rigor, that the outcome will follow from the initial conditions.” Theoretical economic models are highly formalized models describing the effects of a (usually rational) solution to a maximization problem faced by agents.

Econometrics is an empirical branch of economics that uses various quantitative techniques to process observational data with a view to constructing models of data. Generally speaking, econometric models are mathematical functions that relate the values of the right-hand sides of equations (exogenous variables) to the values of the (endogenous) variables on the left-hand sides. Econometric models can be represented symbolically as follows:

$$Y = f(X) + \varepsilon$$

where:

$Y$  — endogenous variable;

$X$  — a vector of exogenous variables;

$f(\cdot)$  — a function relating the values of exogenous variables to the values of endogenous variables;

$\varepsilon$  — the error term denoting the difference between the theoretical (calculated) and the actual value of  $Y$ .

In contrast to theoretical models that are deductive axiomatic systems, econometric models are “estimated.” For simplicity, let me consider a linear regression. This simple kind of econometric model has the following specification:

$$y = a_1 * x_1 + a_2 * x_2 + \dots + a_n * x_n + \varepsilon$$

where:

$a_n$  — a parameter denoting a partial correlation between  $x_n$  and  $y$ ;

$x_n$  —  $n$ -th exogenous variable.

The estimation of econometric models is a process employing statistical methods that “choose” the values of parameters ( $a_n$ ) on the basis of data. In other words, econometric techniques allow us to obtain a mathematical function relating (with approximation) a set of exogenous variables to a set of endogenous variable(s).

In fact, econometric techniques are also employed to analyze quantitatively experimental data (e.g., Andersen et al. 2011, Sacerdote 2007). However, in the context of causal inference, the use of experimental or quasi-experimental research designs (e.g., a natural experiment) is a significant difference that makes for another type of research method. Experimental and quasi-experimental research in economics can be classified into several categories. Natural experiments use interventions beyond the control of economists so as to infer the effects of such interventions (e.g., Burgess, Pande 2005, Jacob, Ludwig 2012). (Actual) experiments result from on-purpose interventions conducted by economists in order to infer the effects of these difference-making factors. The two basic categories of economic experiments are field and laboratory experiments. The former use randomization to divide participants into the experimental and control groups and are conducted in the “field” (i.e., in an environment beyond the control of an experimenter). The latter, in addition to randomization, are conducted in an “economic laboratory,” where participants take part in a simulated market or competitive situation. This makes it possible to isolate the mechanism under investigation by screening it from the influence of other factors.

Below, I discuss the different ways in which these research methods are used and combined in economic research so as to argue that these differences result from different methodological positions accepted by different economists.

## 2. THEORETICAL MODELING AS A CONJECTURE ABOUT A POSSIBLE MECHANISM

Scientific realism in the philosophy of economics is formulated differently from scientific realism in the general philosophy of science. The peculiarity is the recent acceptance of the pragmatist dimension (i.e., the view that the purpose of modeling influences representations), which can be clearly observed in the evolution of Uskali Mäki’s views.<sup>3</sup> The mainstream position in

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<sup>3</sup> Mäki’s views on the role of theoretical models changed from employing the notion of isolation and idealization in the early formulations (e.g., 1992, 1994) to accepting the pragmatist dimension (2009, 2017).

the philosophy of economics focuses its analyses on theoretical models (models of phenomena). Theoretical models are viewed as conjectures about (possible or actual) mechanisms (Ylikoski, Aydinonat 2014, Marchionni 2017). Rodrik (2015: 85) also accepts the view that theoretical models stand for “the dominant causal mechanism or channels at work.” Considering that mechanisms may screen off or multiply one another (Reiss 2007), single theoretical (highly abstract and simplified) models of one mechanism do not imply predictions that can be observed by means of econometrics (without experimental closure). Such a view seems to be present also in Rodrik’s (2015: 91ff.) discussion of models representing different parts of a car and their causal relevance to explaining the car’s breakdown. In the economic world, mechanisms operate without experimental closure and therefore influence each other’s results. The claims that (a) theoretical models represent isolated mechanisms and (b) several economic mechanisms can operate at the same time and place lead to the conclusion that causal claims derived from theoretical models are true only within a model or under experimental closure replicating a modeled mechanism. Given this, supporting theoretical conjectures with econometric evidence of observational regularities implied by theoretical models is fruitless (despite making sense in other Methodological frameworks).

Some economists seem to presuppose this philosophical position in their research and use theoretical and non-empirical models as exclusive evidence for a causal claim. Let me consider Zhou’s (2014) study concluding that “[m]ultiproduct search can significantly influence firms’ pricing decisions” (2014: 2918). The conclusion is put forward exclusively on the basis of a theoretical, axiomatic, and highly mathematized model that instantiates the mainstream practice of economic modeling.

Zhou’s (2014) model is populated by two types of agents: companies (retailers) that set prices on products and consumers that, depending on the costs of search effects, choose a strategy of searching for cheapest products on the market and aim at minimizing their expenditure on a set of goods fulfilling their needs. The model is based on several assumptions specifying, for example, that shopping is done in the market equilibrium, and products are horizontally differentiated. As Zhou (2014: 2922) admits, some assumptions (such as free recall and the presence of the economies of scale in search-driven prices) are “simplifying” in nature, which can be understood as idealization in the standard philosophical literature (Mäki 1994). On the basis of the theoretical model, Zhou (2014: 2932) concludes that “[i]t has been shown that multiproduct search can significantly affect firms’ pricing decisions.” Using the modal verb (“can”) indicates that Zhou refrains from claiming that

his mechanistic model describes observable effects (i.e., that the represented mechanism produces effects strong enough to be observable; other mechanisms may operate and interfere with it). If so, then this model seems to be an excellent example of the view that models are conjectures about *possible* mechanisms. Such models isolate and idealize possible mechanisms operating in the real world without gathering evidence needed to move from the possibility claim to the actuality claim.

Such a practice is in line with Rodrik's (2015: 84) view on economics as a library of models. In this framework, offering new theoretical models of a possible mechanism instantiates horizontal progress — that is, helps economists explain new phenomena or widens the scope of possible explanations.

### 3. CHECKING FOR THE ACTUALITY OF THE MODELED MECHANISM

However, in order to conclude that *a* model is *the* model (in translation to contemporary philosophical language: the model of an actual mechanism, cf. Rodrik 2015: 6), one needs to provide evidence that such a mechanism is an *actual* mechanism — that is, that it operates in the world. Here empirical research enters economic practice. One of the ways to establish that a theoretical model represents a mechanism that operates in the world and produces a causal relation is to reproduce the mechanism in an experimental setting. That is a plausible interpretation of the aim of Bartling's, Fehr's, and Schmidt's (2012) research, which combines laboratory experiment with theoretical models. The economists define their purpose as follows: "to isolate the causal forces that render one or the other bundle profit-maximizing and compare them with the bundles the employers actually chose" (2012: 841). In detail, their study focuses on two mechanisms (screening and competition) that are conjectured in theoretical literature but, because of co-existence, cannot be analyzed separately in observational data.

The first step of their research is to review the theoretical literature and deduce predictions that would be true if the mechanisms represented by the models of the labor market were true, taking into account the social preferences of agents. The second stage is to conduct a randomized laboratory experiment of a labor market. The participants of the experiment could choose the level of effort in response to several treatments (Bartling, Fehr, Schmidt 2012: 846ff.). The experimental closure controlled by economists makes it possible to isolate the mechanism under investigation and establish plausible causal claims about its operation. As the authors put it:

[i]n most labor markets, competition and screening interact in intricate ways. Since they almost always exist simultaneously, it is difficult to identify how competition shapes employers' screening activities and employees' reputation-formation behavior in field data. Our laboratory setting enables us to study this question cleanly by conducting an additional treatment that . . . allows us to answer the question of whether competition renders the control strategy or the trust strategy more efficient. (Bartling, Fehr, Schmidt 2012: 855)

#### 4. THEORETICAL MODELS AS ECONOMIC DESCRIPTIONS OF DATA

In contrast to scientific realism, which interprets models as representations, the pragmatist philosophy of science rejects the view that scientific theories (and, in contemporary debates, models) can be true. Instead, pragmatism emphasizes the practical implications of the products of scientific endeavor (James 1907, Hookway 2016). The pragmatist philosophy of science entered economic methodology via a famous essay by Friedman (2008 [1953]), who argued that the assumptions of theoretical models that are unrealistic (i.e., false) are acceptable if the model delivers accurate predictions.<sup>4</sup> Despite several misinterpretations,<sup>5</sup> *The Methodology of Positive Economics* is now read as a text advising instrumentalist methodology (Mariyani-Squire 2017). According to Friedman's instrumentalism interpreted as a view deriving from pragmatism, economic theories should serve as economic descriptions of observations. As Lawrence Boland puts it, Friedman is "only concerned with the usefulness of the conclusions derived from any theory" (Boland 1979: 503, cf. also Wible 1984). Friedman (2008: 156-157) offers the following two thought experiments. First, he appraises a theory that predicts the location of all leaves on a tree on the basis of the assumption that leaves deliberately calculate sun exposure and choose their location by solving the maximization problem. Second, he considers a theory predicting the behavior of pool play-

<sup>4</sup> "Prediction," used by Friedman in the broad sense of the term, refers to predicting both future and past values of variables.

<sup>5</sup> Friedman's essay has been interpreted as supporting instrumentalism, Popperianism, scientific realism, constructive empiricism, and radical constructivism. It seems that each philosopher of economics attempts to read Friedman's essay through the lens of her own views. As Friedman (2009) himself admits, various interpretations result from inconsistencies and the lack of clarity of his essay. While the text itself and, more widely, instrumentalism in the philosophy and methodology of economics is a broad and philosophically interesting topic (cf. Maziarz 2018b: 68-75), the discussion here, due to the purpose of this article, is limited to a brief overview of this stance and to highlighting the main difference between instrumentalism and scientific realism, as presented by the philosophers of economics.



ers that uses mathematics and physics to calculate the appropriate placements of sticks. Given that, as far as we know, leaves do not solve differential equations, and the hits of pool players are based on intuition, these theories are unrealistic (i.e., literally false). However, given that Friedman's instrumentalism assesses theories in terms of the adequacy of their predictions rather than the truth of their assumptions, these theories get things right to the extent that their predictions are accurate.

An example of such methodology is the study of Jovanovic and Szentes (2013). They analyze the market for venture capital. While they also offer a theoretical model, their purpose is not to explain a phenomenon under consideration (given the view that only a true *explanans* explains) but to propose a theoretical model replicating an empirical dataset. Their study consists of two parts. First, the economists develop a theoretical model describing a world populated by entrepreneurs and venture capitalists. The authors describe the assumptions of the model as follows: “[a]ll agents are risk neutral and discount the future at the rate  $r$ , which is equal to the risk-free interest rate at which agents can save” (Jovanovic, Szentes 2013: 498). The model is based on idealizing (*unrealistic*) assumptions. Two such assumptions are as follows. First, the economists assume the risk-neutrality of agents, which obviously contradicts the risk aversion observed in many studies (Eckel, Grossman 2008, Holt, Laury 2005). Second, contrary to the evidence from financial markets (Altman, Saunders 1997, Bansal, Coleman 1996), they allow their model-world agents to borrow money at a risk-free interest rate.

In the second stage of their study, Jovanovic and Szentes analyze statistically observable data describing the American venture capital market and compare the predictions of their model with these data. More specifically, they consider income distribution, cost profile, cumulative net cash flow, success hazard, survival function, termination hazard, mode of exit, payoffs, and returns. Jovanovic and Szentes give a hint of the purpose of their theoretical conjecture when they conclude that they “fit an equilibrium model to the data” (2013: 526) and indicate that they “have omitted explanatory variables that could help improve the fit” (2013: 525). With such statements, they admit that their theoretical model serves to reproduce the empirical data describing an actual market of venture capital investments and start-up companies — it is not a conjecture as to the actual mechanism producing the observed phenomenon.

## 5. AN ECONOMETRIC MODEL AS CONFIRMATION OF A THEORY

The first modern school in philosophy of science was logical positivism. Although philosophers no longer support this approach, it continues to influence economic methodology. One of the grounds for the presence of outdated philosophical views in economy is the history of econometrics: the quantitative techniques were developed at the time when logical positivism was a mainstream position in the philosophy of science. The doctrine of confirmationism was developed by the Vienna Circle philosophers (e.g., Carnap 1959), who focused on distinguishing between science and nonscience and put an emphasis on empiricism. Logical positivism entered economic methodology through the work of Terrence W. Hutchison (1938, 2000), who focused on some aspects of the doctrine and highlighted quantification, measurement, and confirmation of empirical hypotheses.

In the general philosophy of science, the logical-positivist doctrine was replaced by the Popperian view that the scientific method consists in refutations and corroborations. Although the two positions are in disagreement about their general approach to using evidence in science, logical positivism and Popperian fallibilism are, to some extent, intermingled in the philosophy of economics. A plausible explanation involves knowledge of how the Popperian thought entered economic methodology. Mark Blaug's (1992 [1980]) work seems to blend the two doctrines. For example, Blaug's discussion of case studies in the second part of his book, where he studies cases of "theory testing" by comparing them with observations, is based on a neutral observational language, although Popper opposed it (Fuller 2004: 143). Another argument for interpreting Blaug's works as being jointly inspired by logical positivism and fallibilism is the theory–observation distinction, which is visibly presupposed in Blaug's view on the role of "facts" in theory testing (Blaug 1992: 24). Furthermore, Popper never admits that a single case falsifying a theory should lead to the theory's rejection, whereas such an idea is present in Blaug's book. While the idea that theories (and, in the present-day debates, models) should be "tested" is widespread among economists, the meaning of this claim is tangled and seems to draw on a mix of the two doctrines.

An example of the view on the role of econometric evidence as providing a test for the implications of theoretical modeling is the research of Beaudry, Doms, and Lewis (2010) on the diffusion of personal computers as a new technology. Similarly to the previous case, their study consists of two steps or, to put it in another way, combines two types of evidence: a theoretical model and econometric evidence. However, despite combining the same types of

evidence as the paper analyzed above, the story offered in the article is different. Namely, their paper can be read as an attempt to test empirically the predictions (hypotheses) implied by a theoretical model of radical change (technological revolution): as the authors admit, “[o]ur model generates several specific predictions that can be evaluated using metropolitan area-level data” (Beaudry, Doms, Lewis 2010: 990).

The model put forward by Beaudry, Doms, and Lewis (2010: 992ff.) is populated by companies choosing between technologies to produce goods  $Y$ . The companies operate on a perfectly competitive market, and the technologies require different inputs. Thus, the companies maximize their profit by (1) comparing relative prices of inputs and (2) choosing the cheapest way of production. Technological decisions of companies that, on the basis of assumption 2, rely on the access to skilled labor, shape the diffusion of technology. The two main predictions of the theoretical model are as follows. First, “[a]reas with a low relative price (or high relative supply) of skill are predicted to adopt PCs most intensively.” Second, “the return to skill should become temporarily insensitive to increases in supply” (Beaudry, Doms, Lewis 2010: 990). These predictions are then tested on a dataset covering 217 US cities in the last two decades of the twentieth century — that is, in the period when the PC innovation was spreading. These “predictions,” also referred to as “propositions” (2010: 996), are deduced from the theoretical model.

To test the deduced hypotheses, the economists estimate a simple regression that describes the change in the output of a region between 1980 and 2000 as a function of output at the beginning of the period and a logarithm of the wage gap between college and high school. Beaudry, Doms, and Lewis (2010: 1008-1010) control for some other variables in other regressions. Hypothesis testing proceeds by comparing the deductions from the theoretical model with relevant parameters of econometric models. For instance, after repeating the main hypothesis supported by the model (“a central prediction . . . is that, during a technological transition, the return to skill should increase the most where supply of skill is initially highest”), Beaudry, Doms, and Lewis (2010: 215) interpret the results of econometric regressions: “. . . we report OLS estimates without any additional controls in the full and 1940 samples. These estimates suggest that the return rose significantly faster in initially more educated markets: a 10 percent increase in skills in 1980 . . . is associated with a 0.7-percentage-point larger change in the return to college in 1980-2000.”

Until this point, the story told in the article is in line with Popperian falsificationism. In fact, the authors discuss their actions as an “attempt to falsify” (Beaudry, Doms, Lewis 2010: 1012) the predictions of the theoretical model.

The situation changes when they observe that the basic econometric model gives estimates that are in disagreement with the predictions of the theoretical model (2010: 1015-1016). Their response to this difficulty suggests that their approach is confirmationist rather than falsificationist. In other words, they conduct the econometric exercise with the aim of finding support for the theoretical model and not “proving” its falsity. To wit, the authors admit that the “endogeneity of skill mix should manifest itself in the form of different coefficients on the two components [the 1940 level and the 1940-1980 change]. The estimated effects of both components are similar” (2010: 1016) and not significantly different. In response to this observation being in disagreement with the theoretical model, the economists estimate additional regressions to find empirical support for the model — namely, they look for confirmation of the theoretical model instead of its falsification, which gives a hint that they presuppose a version of the logical-positivist philosophy of science although, in some parts of their paper, pay lip service to the doctrine of falsificationism.

## 6. METHODOLOGICAL PLURALISM IN ECONOMICS

Mainstream neoclassical economics has usually been interpreted as a methodologically-unified project inspired by logical positivism (e.g., McCloskey 1998). Recently, Moneta and Russo (2014) and Rodrik (2015) have argued for two notions of pluralism. On the one hand, evidential pluralism states that economists combine different research methods to establish causal claims. On the other, model pluralism looks for plurality within one research method — that is, within theoretical, axiomatic modeling. Yet the examples of influential economic studies discussed above support “methodological pluralism”: not only do economists offer different types of evidence for causal claims<sup>6</sup> but they also subscribe to different Methodologies. To put it differently, economists, as a group, interpret the same types of evidence (e.g., econometric models, theoretical models) in different ways. In the philosophy of economics, a multitude of philosophical views coexist. In the general philosophy of science, pragmatism, logical positivism, fallibilism, constructivism, critical realism, and scientific realism are schools that have dominated philosophical discussions in certain periods. In the methodological and philosophical discussions about economics, the different views on science (Maziarz 2018b) are still present despite the recent dominance of the scientific realism. Given this,

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<sup>6</sup> Observing the pluralism of evidence is plausible also if economists were methodological monists.

the hypothesis that different methodological “schools” inspire economists to take different approaches to doing research and interpreting results seems plausible.

I need to make two points here. First, while mainstream economics can be a methodologically pluralist science, it is possible that each economist (taken separately) supports one philosophical stance and hence is a methodological monist. It is quite probable considering that the contemporary advancement of research methods requires specialization not only in one field but also in a limited number of related research methods. Second, economists rarely voice their philosophical views. Therefore, the approaches they accept can only be grasped by studying their research practice and analyzing economic texts. Philosophers and economists taking part in the methodological debate seek to “translate” their preferred philosophical views on science into explicit methodological guidance. Differing opinions on advisable research methods and their justified interpretations should be most visible on the frontier of science, where new causal claims are voiced and supported.

The analysis of the four case studies sheds light on the most notable difference in the presuppositions held by economists. Both the theoretical conjecture of Zhou (section 2) and Bartling’s, Fehr’s, and Schmidt’s experimental test of a model of mechanism (section 3) seem to presuppose the view that economic mechanisms do not produce observable regularities because of the co-existence of several mechanisms operating in the social realm. Accepting this view leads to refraining from econometric studies of observational data. Furthermore, the economists’ discussion of mechanisms (theoretical conjecture thereof in Zhou and creating a mechanism under experimental closure in Bartling, Fehr, and Schmidt) supports the claim that economists share the standard philosophy-of-economics view that theoretical models are models of mechanisms.

By contrast, the other two pieces of economic research (discussed in sections 4 and 5) reject this view and aim to establish theoretical models that produce observable regularities. Jovanovic and Szentes (2013) and Beaudry, Doms, and Lewis (2010) share the view that the purpose of theoretical models is to reproduce an observable pattern by means of econometrics. On this basis, it is justifiable to conclude that they do not accept the mainstream view on mechanisms. However, the two studies differ in terms of their interpretation of theoretical and empirical (econometric) evidence. Jovanovic and Szentes (2013) take care to offer a theoretical model that produces accurate predictions of data. Such an approach presupposes estimating an econometric model beforehand. These economists do not account for the truth of their model in terms of its being a model of an actual mechanism or in terms of

a realistic character of assumptions. Instead, they focus exclusively on empirical adequacy. This purpose of research is in accordance with the pragmatist methodology and especially with its instrumentalist version as formulated by Friedman (2008 [1953]). Beaudry, Doms, and Lewis (2010) indicate that their aim is to test their theoretical model empirically. Their research can be interpreted as confirmationist or falsificationist in character. In fact, the authors pay lip service to both conflicting approaches. A possible explanation for this is that Popper's views on science have been popularized in economic methodology by Blaug's (1992 [1980]) work leaning to the neopositivist doctrine.

The normative claims present in Friedman's (2008 [1953]) and Blaug's (1992 [1980]) work still have an impact on the shape of economic research. While scientific realism does not offer directly applicable methodological advice, contemporary debates over the role of theoretical models and mechanisms in the social sciences also seem to shape economists' views on the methodology of their discipline. Given that all the four studies belong to, and are representative of, contemporary mainstream economics, it seems justified that mainstream economics is a Methodologically pluralist discipline. The case studies discussed here show that, as a group, economists accept different philosophical views on science.

#### CONCLUDING REMARKS

Economists rarely reveal their philosophical views on science. In this paper, I have argued that mainstream economics is a methodologically pluralist discipline. My analysis of four recent and influential economic publications shows that economists use different research methods as evidence for causal claims and also interpret the evidence supplied by the results in various ways. The different interpretations can be plausibly explained by indicating that economists, as a group, accept different philosophical views on science.

Causal claims put forward in the analyzed studies are justified by a theoretical model used either as exclusive evidence or in connection to a laboratory experiment, and by joint evidence of theoretical and econometric models. The first two case studies seem to presuppose the view that theoretical models are models of (actual or possible) mechanisms. The last two studies employ similar theoretical models but interpret their role differently: either as an economic description of data or as a theoretical conjecture aimed at producing testable consequences in observable data. These views on the role of different evidence seem to correspond to different schools (paradigms) in eco-

nomic methodology: scientific realism, instrumentalism, and falsificationism (confirmationism). However, even though economists as a group seem to be Methodological pluralists, it is likely that each economist, considered separately, would present (rarely explicitly) methodological presuppositions belonging to only one of the methodological schools.

Finally, I should note that the latter two cases differ regarding the *stories* told in the papers. The research methods used in both cases belong to the standard repertoire of economics — that is, they involve theoretical and highly abstract mathematical models and typical econometric models of data. Shedding light on the actual commitments and research practices would require observing economists' activities in their laboratories.

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